IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Nelson et al.]	Art Unit 1731
Serial No. 10/652,248]	Examiner: Q Dehghan
Filed: August 29, 2003]	Confirmation No. 1864
For: DEPOSITION OF SILICA COATINGS ON A SUBSTRATE]	Attorney Docket: 1-16150

June 6, 2007

MAIL STOP APPEAL BRIEF – PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

BRIEF ON APPEAL

Honorable Sir:

This brief is in furtherance of the Notice of Appeal, which was timely filed in connection with the above-captioned application on March 6, 2007. This Brief is being filed under the provisions of 37 CFR §41.37 and its related requirements. The fees required under 37 CFR 1.17(F) are submitted herewith. A fee for a 1 month extension of time accompanies this brief.

Table of Contents

1. Real Party in Interest

The real party in interest is Pilkington North America, which is a subsidiary of Pilkington Group Limited, which is a subsidiary of Nippon Sheet Glass Limited of Japan.

2. Related Appeals and Interferences

There is no known appeal or interference which will directly affect, or be directly affected by, or have a bearing on, the Board's decision in this Appeal.

3. Status of Claims

On March 6, 2007, applicant submitted a Notice of Appeal in connection with the subject application, appealing the final rejection of claims 1-12.

The status of each of the claims is as follows:

1. Claims cancelled: 2, 10-12;
2. Claims withdrawn from consideration but not cancelled: None;
3. Claims pending: 1, 3-9, and 13-24;
4. Claims allowed: None;
5. Claims rejected: 1, 3-9 and 13-24.

The claims on appeal are 1, 3-9 and 13-24. A copy of the claims on file is submitted in the attached Claims Appendix.

4. Status of Amendments

No amendment was filed subsequent to the final rejection of the application by the Office Action of November 6, 2006.

5. Summary of Claimed Subject Matter

The present invention, as defined by independent claim 1, defines a process for depositing a silica coating upon a heated glass substrate. The process includes providing a heated glass substrate having a surface upon which the coating is to be deposited and directing a precursor mixture comprising a radical scavenger, a silane, ammonia, oxygen and an inert carrier gas toward and along the surface to be coated, and reacting the mixture at or near the surface to form a silica coating on the surface of the glass substrate.

Support for the invention as claimed in claim 1 can be found throughout the application, but particularly:

The deposition of a silica layer on a glass substrate can be found, at least, on page 3, lines 11-15.

The heated glass substrate can be found, at least, on page 5, line 5.

Directing a precursor mixture of a scavenger, a silane, ammonia, oxygen and an inert carrier gas can be found, at least, on page 5, lines 5-10.

Reacting the mixture at or near the surface of the glass substrate can be found, at least, on page 5, lines10-12.

The present invention, as defined in independent claim 16, discloses a process for depositing a silica coating upon a heated glass substrate in an on-line, float glass production process. The process includes providing a heated glass substrate having a surface upon which the coating is to be deposited and premixing monosilane, ammonia, oxygen and an inert carrier gas to form a precursor mixture, directing the precursor

mixture comprising a silane, ammonia, oxygen and an inert carrier gas toward and along the surface to be coated, and reacting the mixture at or near the surface to form a silica coating on the surface of the glass substrate.

Support for the invention as claimed in claim 16 can be found throughout the application, but particularly:

The deposition of a silica layer on a glass substrate can be found, at least, on page 3, lines 11-15.

The on-line, float glass process can be found, at least, on page 4, lines 19-21.

The heated glass substrate can be found, at least, on page 5, line 5.

Directing a precursor mixture of a silane, ammonia, oxygen and an inert carrier gas can be found, at least, on page 5, lines 5-10.

The use of monosilane can be found, at least on page 5, lines 13-16.

Reacting the mixture at or near the surface of the glass substrate can be found, at least, on page 5, lines10-12.

6. Grounds for Rejection to be Reviewed on Appeal

On November 6, 2006, the Examiner issued an Office Action in connection with the present application. This Office Action was made final. The Examiner rejected all of the pending claims. Namely:

A) Claims 16, 18, and 21-23 were rejected under 35 USC §102(b) as anticipated by US 5,432,707 to Dick et al.

B) Claims 1-9, 13-14 and 16-24 were rejected under 35 USC §103 as being unpatentable over US 5,798,142 to Soubeyrand in view of US 6,818,250 to George and US 5,432,707 to Dick.

C) Claims 17, 19, 20 and 24 were rejected under 35 USC §103 as being unpatentable over US 5,432,707 to Dick in view of US 5,798,142 to Soubeyrand.

7. Arguments

Claims 1-9 and 13-14 stand or fall together and will be argued collectively herein, in particular with regard to independent claim 1, which was rejected under combination b).

Similarly, claims 16-24 stand or fall together and will be argued collectively herein, in particular with regard to independent claim 16, which was rejected under combinations a) and b).

A) Rejections of Claims 16, 18 and 21-23 under 35 USC §102 as being anticipated by US 5,432,707 to Dick.

The Dick reference discloses a process for the formation of a silicon-base anti-migration layer on a hot surface of a glass object. The reference is particularly directed to the formation of glass receptacles (bottles) to prevent the migration of ions into liquids contained in the receptacles. The Dick reference indicates (column 1, lines 60-63) that the gaseous mixture is projected onto the ambient surface in an ambient atmosphere, typically free air.

This rejection has been made under the basis of 35 USC §102 which requires that each of the claimed elements be found in the applied reference. Claim 16, as previously amended, defines the production of a barrier layer in an on-line float glass production process, which is not described in the Dick reference. In fact, the formation of glass receptacles, as disclosed in the Dick reference, is inconsistent with the use of an on-line float glass production process, which produces sheets of glass. Further, the disclosure of the Dick reference indicates (column 1, lines 60-63) that the gaseous mixture is projected onto the ambient surface in an

ambient atmosphere, typically free air. This differs from the on-line float glass production process claimed herein.

The Examiner, in paragraph 15 of the final Office Action, acknowledges applicants summary of the Dick reference, but points out that the features upon which applicant relies are not recited in the rejected claims. It is respectfully submitted that claim 16 does positively recite an "on-line float glass production process". It is submitted that that feature alone is sufficient to distinguish the claimed invention from the applied reference. However, one skilled in the art of float glass production processes would understand that such processes are not done in an open atmosphere, and in fact would not be compatible with an ambient process. Therefore, it is believed that this point, while not positively recited, is inherent and further defines over the applied reference.

On the basis of the above, claim 16 is believed to define over the applied reference and reversal of the present rejection is respectfully requested.

B) <u>Rejection of Claims 1-9, 13-14 and 16-24 under 35 USC §103 as being unpatentable over US 5,798,142 to Soubeyrand in view of US 6,818,250 to George and US 5,432,707 to Dick.</u>

US 5,798,142 (Soubeyrand) discloses silane, oxygen, a radical scavenger gas and a carrier gas are combined as a precursor mixture, and the precursor is directed toward and along the surface of the heated glass substrate. The presence of the radical scavenger allows the silane, which is pyrophoric, to be premixed with the oxygen without undergoing ignition and premature reaction at the operating temperatures. The radical scavenger further provides

control of and permits optimization of the kinetics of the chemical vapor deposition (CVD) reaction on the glass. A preferred combination of precursor materials includes monosilane and oxygen, with ethylene as the radical scavenger, and includes nitrogen or helium as a carrier gas.

The Dick reference discloses a process for the formation of a silicon-base anti-migration layer on a hot surface of a glass object. The reference is particularly directed to the formation of glass receptacles (bottles) to prevent the migration of ions into liquids contained in the receptacles. The Dick reference indicates (column 1, lines 60-63) that the gaseous mixture is projected onto the ambient surface in an ambient atmosphere, typically free air.

The George reference discloses a chemical vapor deposition process for forming a SiO_2 layer on a substrate comprising reacting water with a silicon precursor compound having the structure SiX_4, $Si(NR_2)_4$, $Si(OH)_a(OR)_{4-a}$ or $SiH_b(OR)_{4-b}$ wherein each R is an alkyl group, each X is independently a halogen atom, and a and b are numbers from 0-4, in the presence of the substrate at a temperature of between about 290 K and 350 K and in the presence of ammonia or a Lewis base that is a gas under the conditions of the chemical vapor deposition process. The process permits the formation of high quality SiO_2 coatings on various substrates, most notably on a silicon substrate, using a low temperature process. The process is easily controllable to form conformal SiO_2 layers of a desired thickness. Lower deposition temperatures are particularly important to limit interlayer and dopant diffusion as thin film device sizes approach nanoscale dimensions.

Claim 1 indicates that the precursor mixture includes a radical scavenger which is not disclosed in the Dick et al reference (US 5,431,707). The Examiner has used the Soubeyrand

reference (US 5,798,142) in conjunction with the Dick reference to indicate that this combination is obvious. The Examiner cites the George reference to cite a CVD process for coating glass with a silica layer comprising ammonia. Contrary to the assertion of the Examiner, it is respectfully submitted that this claim is not obvious in view of the applied prior art.

The Dick reference discloses a process for the formation of a silicon-base anti-migration layer on a hot surface of a glass object. The reference is particularly directed to the formation of glass receptacles (bottles) to prevent the migration of ions into liquids contained in the receptacles. The Dick reference indicates (column 1, lines 60-63) that the gaseous mixture is projected onto the ambient surface in an ambient atmosphere, typically free air.

While the Examiner indicates that the combination of the Soubeyrand radical scavenger with the ammonia used in Dick would be obvious, applicants respectfully disagree with this position. The disclosure of the present invention show unexpected benefits from the addition of both the radical scavenger (ethylene) and the ammonia to the production process. Specifically, for example, the specification notes that the peak thickness is achieved with a lower percentage of NH_3 as the percentage of ethylene increases and that the biggest boost to coating thickness is when NH_3 is added to a gas stream containing a relatively low percentage of ethylene.

With regard to the George reference, the reference indicates the surface of the substrate to first become coated with a thin layer of water molecules, which are then coated with a thin layer of catalyst molecules, and then with a thin layer of the silicon precursor, at which point the reaction between the water and silicon precursor takes place, forming a very thin SiO_2 layer.

George acknowledges that a certain amount of premixing of the reactants occurs, but instead teaches that the materials are preferably applied sequentially (column 4, lines 5-20). Repeated sequential applications of the reactants and catalyst form or increase the thickness of the layer. It is believed that a contiguous SiO.sub.2 layer may be created from "islands" of SiO.sub.2 that are formed during the first or first several applications of the reactants and catalysts, and which grow and are joined together during subsequent applications of the reactants and catalysts. This is contrary to what is claimed in claim 1 where the reactants are premixed.

It is also noted that the present specification indicates that essentially no nitrogen is deposited in the barrier layer in accordance with the present invention. The reference cited by the Examiner makes no such exclusion, and, in fact, gives no reason for the exclusion of nitrogen from the barrier layer. As noted in the present invention, silica-oxy-nitride coatings yield properties, specifically refractive indices, which may not be useful for the glass products formed from the present invention. Control of these properties, by the exclusion of nitrogen, is an important feature of the present invention. The Dick reference makes no such teaching or suggestion regarding the deposited coating.

For the reasons above, claim 1, and the claims dependent therefrom, are believed to be both novel and non-obvious over the applied references.

Similarly, claim 16, as previously amended, defines the production of a barrier layer in an on-line float glass production process, which is not described in the Dick reference. In fact, the formation of glass receptacles, as disclosed in the Dick reference, is inconsistent with the use of an on-line float glass production process, which produces sheets of glass. Further, the disclosure of the Dick reference indicates (column 1, lines 60-63) that the gaseous mixture is

projected onto the ambient surface in an ambient atmosphere, typically free air. This differs from the on-line float glass production process claimed herein.

It is therefore believed that claim 16 also distinguishes over the applied references. In view of the above, reversal of this rejection is respectfully requested.

C) <u>Rejection of Claims 17, 19, 20 and 24 under 35 USC §103 as being unpatentable over US 5,432,707 to Dick in view of US 5,798,142 to Soubeyrand.</u>

Claims 17, 19, 20 and 24 have been rejected under 35 §103 as being unpatentable over Dick in view of Soubeyrand. Each of these claims are dependent, directly or indirectly, from what is believed to be an allowable claim 16, as discussed above. As claim 16 is believed to be allowable, for the reasons above, it is respectfully submitted that each of these claims are allowable, based, at least, upon this dependence. Therefore, reversal of this rejection is also respectfully requested.

CONCLUSION

In view of the above arguments, it is therefore respectfully submitted that each of the independent claims are allowable over the applied art of record. As claims 1 and 16 are patentable for the reasons discussed, and as claims 3-9, 13-15 and 17-24 depend directly or indirectly from these independent claims, applicant submits these claims are likewise patentable. An expeditious determination by the Board to that effect is respectfully requested.

Respectfully submitted,

Mark A. Hixon
Registration No. 44,766

Attorneys:
MARSHALL & MELHORN, LLC
Four SeaGate, 8th Floor
Toledo, OH 43604
419-249-7114
419-249-7151 – Fax
Hixon@marshall-melhorn.com

CLAIMS APPENDIX

1. A process for depositing a silica coating upon a heated glass substrate comprising the steps of:

a) providing a heated glass substrate having a surface upon which the coating is to be deposited; and

b) directing a precursor mixture comprising a radical scavenger, a silane, ammonia, oxygen and an inert carrier gas toward and along the surface to be coated, and reacting the mixture at or near the surface to form a silica coating on the surface of the glass substrate.

2. (canceled)

3. The process for depositing a silica coating upon a glass substrate as claimed in claim 1, wherein the silane is monosilane.

4. The process for depositing a silica coating as claimed in claim 1, wherein the radical scavenger gas in the precursor mixture is selected from the group consisting of ethylene and propylene.

5. The process for depositing a silica coating as claimed in claim 4, wherein the radical scavenger gas is ethylene.

6. The process for depositing a silica coating as claimed in claim 1, wherein the resultant coating on the glass substrate comprises less than about 1 atomic percent nitrogen.

7. The process for depositing a silica coating as claimed in claim 1, comprising providing an inert carrier gas and adding the inert carrier gas to the precursor mixture, prior to directing the precursor mixture toward and along the surface to be coated.

8. The process for depositing a silica coating as claimed in claim 7, wherein the inert carrier gas comprises at least one of nitrogen and helium.

9. The process for depositing a silica coating as claimed in claim 1, wherein the precursor mixture comprises about 0.1-about 3.0 percent silane, about 1.5 – about 9 percent oxygen, about 1.5 – about 9 percent ethylene and about 7.5 – about 60 percent ammonia, with the remainder comprising an inert carrier gas.

10-12 (canceled)

13. The process for depositing a silica coating as claimed in claim 9, wherein the precursor mixture comprises about 1.5 percent silane, about 6 percent oxygen, about 4.5 percent ethylene and about 15 percent ammonia, with the remainder comprising an inert carrier gas.

14. The process for depositing a silica coating according to claim 1, wherein step b) comprises premixing the silane, ammonia, oxygen and the carrier gas to form the precursor mixture.

15. The process for depositing a silica coating according to claim 1, comprising cooling the coated glass substrate to ambient temperature.

16. A process for depositing a silica coating upon a heated glass substrate in an on-line, float glass production process comprising the steps of:

a) providing a heated glass substrate having a surface upon which the coating is to be deposited; and

b) premixing monosilane, ammonia, oxygen and an inert carrier gas to form a precursor mixture, directing the precursor mixture comprising a silane, ammonia, oxygen and an inert carrier gas toward and along the surface to be coated, and reacting

the mixture at or near the surface to form a silica coating on the surface of the glass substrate.

17. The process for depositing a silica coating upon a glass substrate as claimed in claim 16, wherein the precursor mixture further comprises a radical scavenger.

18. The process for depositing a silica coating upon a glass substrate as claimed in claim 16, wherein the silane is monosilane.

19. The process for depositing a silica coating as claimed in claim 17, wherein the radical scavenger gas in the precursor mixture is selected from the group consisting of ethylene and propylene.

20. The process for depositing a silica coating as claimed in claim 19, wherein the radical scavenger gas is ethylene.

21. The process for depositing a silica coating as claimed in claim 16, wherein the resultant coating on the glass substrate comprises less than about 1 atomic percent nitrogen.

22. The process for depositing a silica coating as claimed in claim 16, comprising providing an inert carrier gas and adding the inert carrier gas to the precursor mixture, prior to directing the precursor mixture toward and along the surface to be coated.

23. The process for depositing a silica coating as claimed in claim 22, wherein the inert carrier gas comprises at least one of nitrogen and helium.

24. The process for depositing a silica coating as claimed in claim 16, wherein the precursor mixture comprises about 0.1-about 3.0 percent silane, about 1.5 – about 9 percent oxygen, about 1.5 – about 9 percent ethylene and about 7.5 – about 60 percent ammonia, with the remainder comprising an inert carrier gas.

EVIDENCE APPENDIX

none

RELATED PROCEEDINGS APPENDIX

none